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14. ABSTRACT This project goal was to collect and assemble all available field data from the ONR sponsored Labrador Sea Deep Convection Experiment, and to make this data available to interested scientists in the form of an internet site and as CD-Roms. Maintain LabSea www site at LDEO server.					
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Final Technical Report
Labrador Sea-Convection Data CD-ROM

Award:
N00014-98-1-0302

extension of:
**Omnibus: Real Predictions of the Convective
Activity in the Labrador Sea**

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Palisades, January 2003

Project Goal:

The project goal was to collect and assemble all available field data from the ONR sponsored Labrador Sea Deep Convection Experiment, and to make this data available to interested scientists in form of a internet site and as CD-ROMs. Maintain LabSea www site at LDEO server.

Background:

The field phase of the Labrador Sea Deep Convection Experiment took place between 1996 and 1998 (Lab Sea Group, 1999; special issue of J. Phys. Oceanogr., 2002). Several different projects were realized and lead to a substantial amount of data. This data is stored and maintained by the various groups. Typically it exists only in the format of their choice. Effective exchange of data between the groups is hampered by the need to contact the scientist, to obtain the data, to understand the format in which it is stored, and to convert the data to the own format of choice.

Over the past years several data centers have been established as part of global observational efforts such as the World Ocean Circulation Experiment (WOCE) or as part of national data collection efforts such as the National Oceanographic Data Center (NODC). In contrast to these larger efforts the scope of our project is much more limited. We aim to assemble only the data from the Labrador Sea Deep Convection Experiment. The concentration on one experiment allows us to collect all data sets obtained during the field phase, whereas other data centers typically handle only data of a single type, thereby forcing scientists who are interested in comprehensive data studies to assemble data from various locations. In particular emphasis was placed on maintaining high resolution and a good meta-data that describe the individual data sets and their source.

Recently some of these centers have started to move from their own data format, which typically differed from data center to data center, to the machine independent NetCDF format (<http://www.unidata.ucar.edu/packages/netcdf/>). We follow this lead and convert all data sets received from the different parties into NetCDF format. We expect this step to have two positive effects. Firstly, it will simplify the exchange between the different groups as they won't have to understand and convert between the various data formats. And secondly, it will further spread the usage and acceptance of the NetCDF format and thereby simplify the future exchange of data.

Project Accomplishments:

- We have collected 65 different data sets.
- We have converted these data sets from the format in which we received them to the computer independent NetCDF format.
- We have put together a browsable html-directory of the data collection.
- We have created preliminary CD-ROMs containing the data collection and distributed them to select contributors of the data for feedback on format, errors, and general usability.
- We have prepared the publication of a 'data brief' that will be submitted in due course to the American Geophysical Union's G-Cubed electronic journal.
- A web server is up and running, serving the latest version of the data collection. The site will be introduced to the public with the publication of the 'data brief', through the distribution of the final version of the CD-ROMs, through the Labrador Sea Deep Convection Experiment e-mail list, and through personal contacts.

The chief scientists of the Labrador Sea Deep Convection Experiment have been contacted and informed of our project. All were forthcoming and provided us with their data. In Table 1 we have summarized the number of data sets in the basic data types.

Table 1: Number and size of data sets broken up into basic types.

<i>Data Type</i>	<i># Data Sets</i>	<i>MByte</i>
CTD	23	37
Lowered ADCP	2	1
Nansen Bottle	9	1
XBT	1	1
Surface drifters	1	2
VCM floats	1	5
ALACE floats	1	1
Lagrangian Drifters	1	20
Profiling floats	2	11
Meteorological data	3	3
Radio sonde ascend	1	7
Aircraft data	1	4

<i>Data Type</i>	<i># Data Sets</i>	<i>MByte</i>
Vessel-mounted ADCP	4	1
Moorings	12	85
Model output	1	256
Sea ice	2	51
Sum	65	486

The data has been converted from the format in which we obtained it to the computer independent NetCDF format. The files have also been complemented by ancillary information such as the chief scientist responsible for the data or contact e-mail addresses.

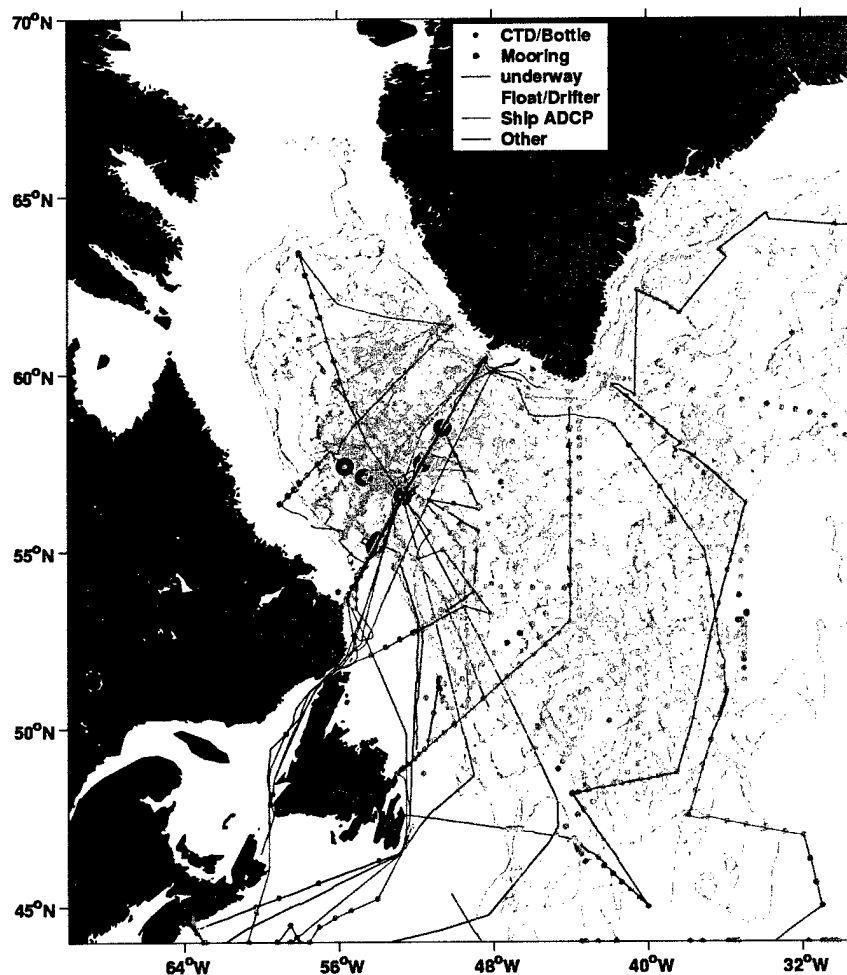


Figure 1 shows the location of the various data points given in the CD-ROM data sets.

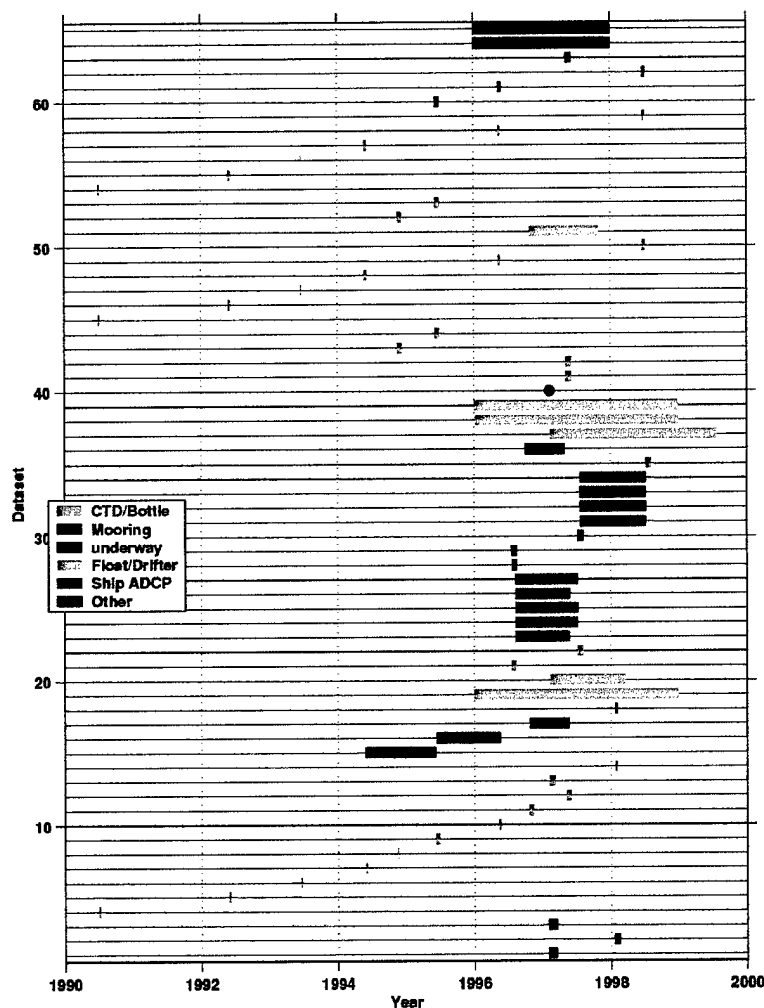


Figure 2 shows the time coverage of the data sets contained in the CD-ROM for the various data types.

All data sets have been assembled in a browsable html-based directory (preview under <http://xtide.ldeo.columbia.edu/~krahmann/labsea/labseahome.html>). Each data set has its own html-page describing the contents of the file, noting the chief scientist, and linking to further information such as web pages or documentation files. For a few data sets we also included documentation files in the data collection.

We have tested the layout of the data collection on preliminary CD-ROMs. Some of these versions have been made available to a few of the contributors and we have received some comments and suggestions on the contents.

We are in contact with the editors of G-Cubed, an electronic journal of the American Geophysical Union, to which we soon will submit a 'data brief' describing the data collection and announcing its availability.

All the data has been put on an internet server from where the browsable directory can

easily be explored. The data can then be downloaded from the same server. Updates or errata will be made available through this server. The link will be made public as soon as the data brief has been accepted at the G3 journal.

While most of the resources have been spent on the data collection and preparation MV has worked with other investigators on the data analysis of the experiment. Two papers have been published in the JPO special issue (Khatiwala et al 2002; and Houghton and Visbeck 2002).

Impact / Applications

The DATA-CD-ROM is expected to provide that foundation for several future studies that look at convection in the Labrador Sea.

Transitions

Not applicable.

Related Projects

This project is well connected to many other components of the Accelerated Research Initiative "Deep Convection". We have work with sea going PIs to guide their observational strategies, disseminate information relevant to the group and also provide some generic information about the ARI on the web.

More recently close collaboration with Peter Schlosser, Robert Houghton and Samar Khatiwala from Lamont has been beneficial.

Acknowledgements:

We would like to thank Peter Guest, Russ Davis, Peter Niiler, Peter Rhines, Friedrich Schott, Eric d'Asaro, Ian Renfrew, Kent Moore, Mark Prater and Allyn Clarke for contributing their data to the collection. We would also like to thank all who ventured into the Labrador Sea to actually make the measurements.

References:

The findings from most of our work can be found on the web under <http://www.ldeo.columbia.edu/~visbeck/labsea>

Publications:

The Lab Sea Group: The Labrador Sea Deep Convection Experiment. Bull. Amer. Meteor. Soc., 79(10), 2033-2058, 1999.

The Labrador Sea Deep Convection Experiment. Special Issue *J. Phys. Oceanogr.* **32**, 2002.

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Khatiwala, S. and M. Visbeck, An estimate of the eddy-induced circulation in the Labrador Sea., *Geophys. Res. Lett.*, 27, 2277-2280, 2000.

Khatiwala, S., P. Schlosser, and M. Visbeck, Tracer Observations in the Labrador Sea. *J. Phys. Oceanogr.*, **32**, 666-686, 2002.

Lilly, J., P. Rhines, M. Visbeck, R. Davis, J. Lazier, F. Schott and D. Farmer, Observing deep convection in the Labrador Sea during winter 1994-1995. *J. Phys. Oceanogr.*, **29**, 2065-2098, 1999.

Appendix:

List of Principal investigator and data types contained on the CD-ROM:

Peter Guest / Naval Postgraduate School

peter.guest@nps.mil
KN 147 meteorological measurements page
KN 156 meteorological measurements page
Surface meteorological data of cruise R/V Knorr KN 147
Surface meteorological data of cruise R/V Knorr KN 156
212 Radiosonde ascents of cruise R/V Knorr KN 147

Russ E. Davis / Scripps Institution of Oceanography

redavis@ucsd.edu
VCM data (1997 - 1999)
ALACE floats (1996 - 1998)
PALACE floats (1996 - 1998)

Pearn P. Niiler / Scripps Institution of Oceanography

pniiler@ucsd.edu
Surface drifters

Peter B. Rhines / University of Washington

rhines@ocean.washington.edu

CTD data of cruise CSS Dawson 90012 (Jul 1990)
CTD data of cruise CSS Hudson 92014 (May/Jun 1992)
CTD data of cruise CSS Hudson 93019 (Jun 1993)
CTD data of cruise CSS Hudson 94008 (May/Jun 1994)
CTD data of cruise FS Meteor M30/3 (Nov 1994)
CTD data of cruise CSS Hudson 95011 (Jun/Jul 1995)
CTD data of cruise CSS Hudson 96006 (May 1996)
CTD data of cruise CSS Hudson 96026 (Oct/Nov 1996)
CTD data of cruise CSS Hudson 97009 (May/Jun 1997)
CTD data of cruise R/V Knorr KN 147 (Feb/Mar 1997)
CTD data of cruise R/V Knorr KN 156 (Jan/Feb 1998)
Mooring data Bravo (May 1994 - Jun 1995)
Mooring data Bravo (Jun 1995 - May 1996)
Mooring data Bravo (Oct 1996 - May 1997)

Friedrich Schott / Institut fuer Meereskunde Kiel

fschott@ifm.uni-kiel.de

CTD data of cruise FS Valdivia V161 (Jul 1996)
CTD data of cruise FS Meteor M39/4 (Jul 1997)
Mooring data K1 (Aug 1996 - May 1997)
Mooring data K2 (Aug 1996 - Jul 1997)
Mooring data K4 (Aug 1996 - Jul 1997)
Mooring data K5 (Aug 1996 - May 1997)
Mooring data K6 (Aug 1996 - Jul 1997)
LADCP data of cruise FS Valdivia V161 (Oct/Nov 1996)
Underway data of cruise FS Valdivia V161 (May/Jun 1997)
LADCP data of cruise FS Meteor M39/4 (Feb/Mar 1997)
Mooring data K11 (Jul 1997 - Jul 1998)
Mooring data K12 (Jul 1997 - Jul 1998)
Mooring data K15 (Jul 1997 - Jul 1998)
Mooring data K17 (Jul 1997 - Jul 1998)
CTD data of cruise FS Valdivia V172 (Jul 1998)

Eric d'Asaro / University of Washington

peter.guest@nps.mil

XBT data of cruise R/V Knorr KN 156
Lagrangian Drifters (1997-1998)

Ian Renfrew / British Antarctic Survey

ire@bas.ac.uk

Aircraft data

G.W.Kent Moore / University of Toronto

moore@atomsp.physics.utoronto.ca

Modified NCEP/NCAR reanalysis data

Mark Prater / University of Rhode Island

mprater@gso.uri.edu

Profiling RAFOS float data

Allyn Clarke / Bedford Institute of Oceanography

clarkea@mar.dfo-mpo.gc.ca

CTD data of cruise CSS Hudson 97009 (May/Jun 1997)
Bottle data of cruise CSS Hudson 97009 (May/Jun 1997)

WOCE hydrographic program

WOCE hydrographic program web site

CTD data of cruise FS Meteor M30/3 (Nov 1994)

CTD data of cruise CSS Hudson 95011 (Jun/Jul 1995)

CTD data of cruise CSS Dawson 90012 (Jul 1990)

CTD data of cruise CSS Hudson 92014 (May/Jun 1992)

CTD data of cruise CSS Hudson 93019 (Jun 1993)

CTD data of cruise CSS Hudson 94008 (May/Jun 1994)

CTD data of cruise CSS Hudson 96006 (May 1996)

CTD data of cruise CSS Hudson 98023 (Jun/Jul 1998)

bottle data of cruise FS Meteor M30/3 (Nov 1994)

bottle data of cruise CSS Hudson 95011 (Jun/Jul 1995)

bottle data of cruise CSS Dawson 90012 (Jul 1990)

bottle data of cruise CSS Hudson 92014 (May/Jun 1992)

bottle data of cruise CSS Hudson 93019 (Jun 1993)

bottle data of cruise CSS Hudson 94008 (May/Jun 1994)

bottle data of cruise CSS Hudson 96006 (May 1996)

bottle data of cruise CSS Hudson 98023 (Jun/Jul 1998)

Ship ADCP data of cruise CSS Hudson 95011 (Jun/Jul 1995)

Ship ADCP data of cruise CSS Hudson 96006 (May 1996)

Ship ADCP data of cruise CSS Hudson 98023 (Jun/Jul 1998)

Ship ADCP data of cruise CSS Hudson 97009 (May/Jun 1997)

National Snow and Ice Data Center

SSM/I sea ice concentration (Bootstrap algorithm)

SSM/I sea ice concentration (NASAtteam algorithm)